Health journalists' perceptions of their professional roles and responsibilities for ensuring the veracity of reports of health research

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ABSTRACT:

Health industries attempt to influence the public through the news media and through their relationships with expert academics and opinion leaders. This paper reports the results of a study of journalists' perceptions of their professional roles and responsibilities with regard to relationships between industry and academia.

Journalists believed that responsibility for the validity of their reports rested with academics and systems of peer review. However this fails to account for the extent these interactions and the failures of peer review. Health journalists' retention of a critical stance regarding industry-academia relationships will include advocacy for and adoption of mandatory reporting of these relationships.

INTRODUCTION

Health-related industries, including companies producing medicines, medical devices and nutritional products, exist in a highly competitive marketplace. In order to promote knowledge of, and interest in their products and services, industry organisations may seek to place information, either directly or through public relations companies, in news media, due to the broad readership and impact that news media have on the lay public's attitudes and behaviours¹.

That the news media has a pervasive influence on the health behaviours of the lay public, and that this, in turn, may significantly impact upon both the health of individual consumers and the utilisation of resources is really beyond question (Brown & Walsh-Childers, 2002; Schwitzer, 2003; Stevens, 1998). Given this, it may be that when journalists report on health issues they have a special responsibility to ensure the accuracy and integrity of their work to maintain high standards of reporting that do not mislead consumers. This is especially true when journalists receive their information from commercial sources, who are often more interested in using the news media to promote their products than to inform the public.

Unfortunately, the accuracy of reports about reporting the benefits and risks of commercial products such as medicines, medical devices and nutritional products is often poor (MacKenzie, Chapman, Barratt, & Holding, 2007; Moynihan, Bero, Ross-Degnan, & Henry, 2000). While journalists frequently include commentary by

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¹ Different countries have different legal regulations with regards to direct-to-consumer-advertising (DTCA) of medical treatments and devices, In Australia, DTCA of prescription pharmaceutical products is illegal, however non-prescription pharmaceuticals, complementary medicines and medical devices may be legally advertised under certain conditions. Despite differences in health regulation between countries, it is likely that the general themes of our research are broadly generalisable and that the issue i.e. the process by which journalists establish the veracity of the research that they are reporting, applies across national borders.

opinion leaders and leading researchers to increase the authority and veracity of their reports of health-related research and products, it is well established that academia itself increasingly forms ties with industry (Campbell & Zinner, 2010; Zinner, Bjankovic, Clarridge, Blumenthal, & Campbell, 2009) and the commercial ties of the researchers and research organisations upon whom journalists rely for their "expert" opinions are rarely established or made explicit (Moynihan et al., 2000). As a result, the public reading or viewing the news may have little knowledge of these relationships and their potential influence on the content of information being presented.

Whilst the effects of health industries' promotion on doctors' prescribing practices has been well documented (Spurling et al., 2010; Wazana, 2000), little formal investigation of journalists' links with health industry and its influence on reporting of health news have been undertaken. In particular, we know little about journalists' attitudes towards these relationships and the ways in which they manage them in their everyday practice. This is a serious lacuna given the reach of health news media and its potential to influence public behaviour.

Much has been written about the concept of professional roles. For the purposes of this paper, we have used a definition of role drawn from role theory's triadic concerns of "...patterned and characteristic social behaviors, parts or identities that are assumed by social participants, and scripts or expectations for behavior that are understood by all and adhered to by performers." (Biddle, 1986, p. 68). Roles that have been ascribed to journalists include facilitating democracy, gatekeeping, framing and agenda setting (Hayes, Singer, & Ceppos, 2007). Each of these roles, as with the

roles and obligations that define any profession, are normative i.e. they define the ways in which this professional group *should* behave. As a way of understanding the interconnection of "roles, values and content" (Hayes et al., 2007, p. 263) in journalism we find useful Elliott's (1988; 2009) discussion of 'essential shared values'. These values include striving for reporting that is balanced, accurate, relevant and complete, and ensuring that reporting does not cause preventable harm and gives citizens information they need for self-governance. These roles and values provide criteria by which journalists' actions can be judged.

In recognition of the importance of journalists' roles, and the need for clarity around their values, the Association of Health Care Journalists devised a Statement of Principles as part of an effort to improve the quality, accuracy and visibility of health care reporting (Schwitzer, 2004). The Statement of Principles includes explicit reference to journalists needing to investigate and report possible links between sources of information and promoters of the information, including links between researchers, private companies and public institutions. Independence from agendas of industry and the paramount importance of public interest to reporting are also featured in the Statement, e.g. "We are the eyes and ears of our audiences/readers; we must not be mere mouthpieces for industry, government agencies, researchers or health care providers." (Schwitzer, 2004, p. W12).

Here we report the results of a qualitative study of journalists' perceptions of their roles and responsibilities with regards to reporting about commercial products or industry-funded research.

METHODS

The analysis presented here draws on in-depth, semi-structured interviews from a study of journalists reporting on health in Sydney, Australia. The study was approved by the University of Sydney's Human Research Ethics Committee. Journalists were chosen if they had written about health issues in television news, current affairs or print media in the past two years. Participants were identified through searches of the Australian Health News Research Collaboration (Chapman et al., 2009) and Factiva databases and then contacted by email or telephone up to three times. Purposive and snowball sampling were then used to ensure a broad range of perspectives were included. During interviews, we asked participants to recommend colleagues who fit our recruitment criteria that we might approach to participate in the study. This snowball technique served to validate our original recruitment strategy and demonstrate sampling saturation as the majority of those suggested had already been identified during the purposive sampling stage. Sixteen journalists responded to our requests for participation in the study, of whom thirteen agreed to be interviewed.

The sample was drawn from journalists working at five free to air television stations broadcasting from Sydney, three of which employed dedicated health journalists and from three daily national newspapers based in Sydney, two of which have employed dedicated health journalists. Each station and publication has numerous other generalist journalists who report on health stories. Sixteen journalists responded to our requests for participation in the study, of whom thirteen agreed to be interviewed. Participants included journalists working in television and print media, commercial and non-commercial stations/publications and specialist and generalist journalists, as well as four expert-journalists (medical doctors or nutritionists who also write or

present health related news). All three Sydney daily newspapers and four of the five free to air television stations were represented in the sample. Participants included 2 males and 11 females. They ranged in age from 25-65 years and all had tertiary qualifications (however, not all the qualifications were in journalism with the expert journalists holding qualifications in their field of expertise). Of the final sample, 8 worked in the television industry and 6 in the print media².

Each participant was interviewed about their knowledge and experiences of industry attempts to influence health news reporting, their strategies for managing industry approaches, and their views on the desirability or otherwise of industry involvement in the generation of health news. Interviews were digitally recorded, transcribed and de-identified. An initial coding framework was developed based on our research question: 'How do health journalists navigate their relationships with health industries?' Thematic analysis was undertaken by two researchers who independently coded identical portions of interview transcripts and identified and defined prominent themes in the data. Consensus regarding the definition of themes was reached through an iterative process involving constant comparison and discussion of the two researchers' application of the coding framework. This led to the identification of two distinct lines of inquiry – how health journalists managed direct attempts by health industries to influence their reporting and how health journalists approached industry influences mediated through academia. This article describes how health journalists view their roles and responsibilities when reporting on scientific research that has been reviewed and/or communicated through academic processes, institutions and

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² One participant worked in both television and print news.

individuals. Our analysis of the responses to direct approaches will be reported elsewhere (reference to be added following peer review).

RESULTS

Journalists' role and responsibilities

In discussing their professional roles, journalists identified their primary responsibility to be the education of the lay public (who they regarded as lacking specialised knowledge of science or medicine, including research methodology) on health issues:

So [my articles] are a lot of common sense approach more than anything else, I'm not here to educate the PhD people, I'm here to educate the, you know, the run of the mill people when I'm doing more media related things... I just want to get a good simple message across [Expert journalist]

Journalists, therefore, tended to view themselves as "translators" of science and/or biomedicine for the lay public

I've often positioned myself as being someone who can translate the science into everyday messages and I think that's really important that we have that dialogue... I sort of see myself as being that sort of through route for science to be able to get a message out to the public accurately and help the public to understand. [Expert journalist]

Unsurprisingly, therefore, the participants in our study tended to believe that they had the potential to improve the health literacy, and therefore the health, of the public

There are very good studies that show that improved health literacy in a population improves health outcomes. All health reporting is good, it is good [Expert journalist]

They described themselves as having an obligation to the public, rather than to any industry or organisation

If you write stories that people can read and come away feeling as if they are being duped, you have written a story that has failed... So the pressure comes from the eyeballs of our readers, not so much the commercial imperatives of the companies contacting you. [Journalist]

In terms of their more specific professional responsibilities, journalists emphasised their commitment to traditional principles including accuracy, balance and independence:

I think the idea is to... have a trusted brand where people can hear something from you and bet the farm on it that it is a true, valid if not RCT based but well thought through, evidence based approach, and to counter misinformation with good information and hope that in the market place of ideas mine rise to the top [Expert journalist]

That's a really big responsibility on the journalist just to make sure that you're not disillusioning people and that you're not flogging, publicising expensive shonky stuff that's going to rip people off... there are some things where the public is suss about some stuff but they'll suspend that disbelief if it's something that they really desperately want to try and of course that then makes the responsibility a lot greater on journalists not to be colluding with people to rip the public off basically, which is a big problem [Journalist]

Most noteworthy about journalists' descriptions of their professional role and responsibilities was their relationality – they invariably defined their own roles and responsibilities in relation to the responsibilities of the other major stakeholders, most notably the scientific academic community and the lay public.

Academia's role and responsibilities

The scientific academic community was relied on by journalists not only as a source of story material, but also as a body that could verify journalists' interpretation of specialised scientific information—including information produced as a result of relationships between academia and commercial entities. In other words, journalists relied upon the processes, institutions and individuals of the international scientific academic community for their expertise and saw the ultimate responsibility for validity and accuracy as lying with these academics:

Journalists don't have the skills to scrutinise on whether that research is fair dinkum³ or not. It's up to another academic or someone else to go, "Actually, no that research is flawed because it was funded by such and such" [Journalist]

Journalists' perceived that they had little choice but to accept academic authority because of limitations of their expertise and the limited access they had to information about academic processes and individuals. Journalists' reliance on academic research organisations, including universities and health services, was founded primarily on the view of them as being both rigorous and independent and this, in large measure, was seen to stem from processes of scientific peer review:

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³ 'Fair dinkum' is Australian slang meaning 'an assertion of truth or genuineness' from http://www.pacificislandtravel.com/australia/about_destin/culture_dictionary.asp accessed 15th September 2011

I suppose the dairy industry has sponsored some interesting work around dairy foods and weight loss for example, and that is sufficiently in the sort of peer reviewed, adequately scientific literature that we would report it even though it might be sponsored by the dairy industry. The meat industry is another one that sponsors work but they often do it through the CSIRO which, while that's not the perfect organisation either and it is an industry organisation, it is there to research industry's research agenda basically but it does so according to standards of scientific principles which I still think are largely unassailable, I think, you know, there's nothing inherently wrong with the conduct of proper evidence based science [Journalist]

Thus, even when industry had funded research conducted by these research institutions, the scientific authority of that institution and the authority that resulted from publication of research data in the peer-reviewed literature gave credence to the claims of the research:

I do look at which journal the study is published in and that tells you a lot. If it's a peer reviewed, decent good journal then you can trust the research. So, you know, a lot of people criticise studies done by, "Oh but it was funded by the Tea Association of India" or something, or "It was published by the sugar industry", sometimes I think that's very unjust... we can't criticise industry for not doing any research and then criticise them when they do fund research. As long as that research is carried out by an independent party, not by the company itself then you have to assume that that, particularly when it's a university or a research facility, then there's no way the research is biased So I think we have to have a little bit of trust, and that will be picked up by things like peer reviewed journals

have experienced editorial boards who look across and make sure that the studies are well designed, that they're well put together and those are the studies that end up getting published. So when I look at research, yes I might look at who funded it, but if it's carried out independently by a university and it's published by a peer reviewed journal then I give it some credence and some trust. [Expert journalist]

And just as the status of the research organisation or academic journals was believed to provide some guarantee of veracity, so the individual experts working within these organisations were felt to be credible—by virtue of employment by that organisation or by their academic standing in the relevant area.

I've got experts in every field that I tend to use. So it might be, say, [type of] cancer, I'll ring up [medical researcher name] from [Australian cancer research institution] and just say 'what do you think of this new study?' and get her viewpoint... I've got experts in every area of medicine who I turn to... they're usually the leaders of their field, they're normally the person that other doctors would go to to talk about something so they tend to be in a leadership position or they tend to be both clinicians and researchers as well, they tend to... be really into research but also, so they're across all the good research but they often are clinicians as well, which is good, they're not just sitting in an office somewhere just poring over books... and sometimes they'll say, "Look, this is a very small step forward", or other times they'll say, "Yeah, this is really important". [Journalist]

For this reason, ties with industry were not necessarily seen to undermine the credibility of these academic experts:

I basically try to find people who are the leaders in their field so, and they usually stand out ... the most prominent person say in genetic research or neuroscience, they might be one of a handful of the top people in Australia so they sort of stand out from the crowd... I haven't looked into their background and I haven't looked to see what ties they've got, have with drug companies but just knowing the work that they do, they tend not to be people that have a lot of [industry funding], well I mean some do [Journalist]

While all participants thought it was crucial that they were aware of the involvement of industry, there was less consensus regarding whether industry funding of health related news items needed to be disclosed in reporting. Some participants said that this was a crucial piece of information that should always be included when reporting research results.

... if it ever is involving, say, a new cancer drug and I know that they have been funded by a certain body I'll try as much as I can to put that in the article as well. I definitely try to put that in. [Journalist]

In contrast, for others the mere disclosure of industry funding tended to impugn the integrity of research and unfairly discredit methodologically sound research results.

I don't believe that it can be established just by the fact that [a researcher] has run a study that in turn has been funded by a company that their views should be discounted. And I think that in the context of a 300 word news story ... to make the point of including that, however briefly, is saying to the reader, "this

is being included for a reason." And it effectively flags that you can discount what this person says, or what this person says is suspect or this person has been bought. So that's a real problem, I think it's a very interesting issue, it's a real dilemma. Because everything in a news story is selected for a reason and by selecting it you imbue it with significance and you say to the reader, "This is a significant fact" and the extent to which it is significant is a mystery. We don't know. And so you're possibly overstating it just by stating it.

[Journalist]

Others felt that readers might be bored by unnecessary caveats and disclosures, or confused by the unstinting use of chemical or generic rather than brand names for medications in an attempt to avoid contributing to product promotion.

You can't bore people and you can't give them things they won't understand or won't engage in. And scientists don't always understand this. There is no point putting so many caveats and details up front that people are turned off after the first paragraph. The exercise is to put things out there that are grossly simplified – but that doesn't make them inaccurate – and that canvasses what the debate is in honest terms. ... You always have to conduct the exercise of what is the most important information here and sometimes the fact that it's industry sponsored isn't the most important piece of information. Much as those conflicts should in theory be declared I still think journalists need to assess each case on its merits, say "what's the important material here?" [Journalist]

The practice of including information about commercial funding of academic research was a matter of personal judgement rather than a reporting standard:

It's one thing to get a press release with Meat and Livestock at the bottom, but it's another to go and interview a researcher in nutrition and not be aware that some of their research is funded by an industry organisation. I mean I'm getting into the habit now of saying, "Oh, who funded this research?", I do try to remember to do that...if I want to use the information because it suits, because I think it's useful and it suits the story then I will use it but I will say who fund, you know, in brackets, the study was funded by you know, Dairy Australia or whatever. [Journalist]

In this way journalists' definition of the role of academia as responsible for judging the credibility of research served to demarcate their own role of translating health information for the lay public. The task of policing the integrity of research and its practitioners was seen to be the responsibility of the academic community itself.

Lay public's role and responsibilities

Journalists perceived their professional responsibilities to also be bounded by the responsibilities that they believed the lay public had for their own health. While the participants in the study accepted that the lay public lacked power, authority and expertise, they also expected that the lay public could, or should, critique the information they read or heard in media reports of health news, since health news was not the only medium through which they could investigate matters relevant to their health:

[W]e're a starting point, nothing that the journalist ever produces should be considered to be a perfect nugget or the final word on any topic at all. I think that you need to consider news reports an incremental part of a bigger work in progress... I think certainly the younger generation of the public would be aware of that... It's up to people I suppose how they interpret the world that they live in. But I think that the world is sufficiently complex now in so many ways that I would think it would be a minority of people who would read a news report and just believe it to be true. [Journalist]

The journalists limited their responsibility not only for the comprehensiveness of the information they published (as above) but also for their right to intervene in an individual person's behaviour. Instead their respect for individual autonomy meant that their role was to provide balanced information so that people could make informed decisions about the suitability of a treatment or service for their specific health circumstances:

[This journalist's role is] acknowledging and supporting the patient's right to make that decision, even in the presence of proof that there could be some harms. So for example we know that women who take multi-vitamins while they're on chemotherapy have a higher relapse rate than women who don't take multi-vitamins while they're on chemotherapy for breast cancer. Now, even though a lot of patients know that they will still choose to do that... it's immoral for any of us to try and interpose our beliefs on anybody else, even in the presence of some level of proof that what they're doing is harmful, does not

preclude us from being a part of that journey, as long as the patient is making an informed decision, we should treat them like adults and give them the due dignity that they deserve to make that decision for themselves...we all have different levels of intelligence, we have different levels of prejudices and background, I just feel that every adult should have the right to make these decisions, and even the one that I think is a completely potty decision which is not vaccinating your children ... at the end of the day it's not my role to grab that child and vaccinate them, it's got to be their decision. [Expert journalist]

And even though some journalists maintained a strongly libertarian view, arguing that each reader or viewer was ultimately responsible for their own health, many referred to the presence, in their readers' lives, of medical experts who could act as gatekeepers for information about, and access to, health-related goods and services.

It's not patients who go to a vending machine and put their money in for a [product], it's the GPs and the surgeons who provide it. They're supposed to be the ones who are really in command of the evidence and they're not supposed to be getting their information from the daily newspaper that gets read over the cornflakes, so I think, you know, I do think sometimes the lay reader is held to a standard that's perhaps a bit unfair. [Journalist]

Journalists thus further limited their professional remit to providing information in ways that provided an accurate, balanced view and could be understood by the public. They did not see themselves as responsible for the actions engaged in by the public resulting from viewing or reading media reports. This perceived ability of individuals to determine their own actions also limited the responsibility the

journalists felt for publishing stories containing a commercial angle, as they considered the public to be able to discern this commercial interest and again decide whether they believed the products and services to be appropriate for their specific health circumstances.

DISCUSSION

In recent years, developments in information technology, the growth of social media and the emergence of the 24 hour news cycle have dramatically changed the way news is generated and presented (Deuze, 2003; Flew, 2009). Awake to these changes and to the opportunities they provide to shape the attitudes and purchasing behaviour of consumers, industry and the public relations companies they employ have emerged as increasingly active participants in news coverage—developing wide-ranging relationships with journalists and media organisations, and using a range of techniques to place their products and services in the news (Burton, 2001; Schwartz, Woloshin, & Moynihan, 2008). While these developments have undeniably opened up new modes of communication, they may also challenge the ability of journalists to uphold the profession's essential shared values (Elliott, 1988, 2009) and maintain an independent stance (Schwitzer, 2004).

This study provides an insight into the way that journalists construct and maintain their professional roles in this current media environment. The participants in this study all articulated a commitment to essential shared values (Elliott, 1988, 2009) of accuracy, balance and independence and described how their primary aim was to educate and inform the public. These commitments were demonstrated in practice

through presentation of health information in 'everyday language', checking of scientific information with trusted expert sources prior to publication and inclusion of alternative perspectives in their stories.

While all journalists claimed to be committed to accurate reporting, they also described how limitations of their expertise, restricted access to information, and time constraints meant that they had to trust processes (peer review), institutions (universities) and experts (academic researchers) to inform them about, and ensure the accuracy of, information they intended to publish. And while aware of the extent of industry involvement in health-related research and the wide range of interactions between industry and academia, journalists generally relied upon academics' voluntary declarations of conflict of interest. Furthermore, the journalists interviewed in our study also perceived that adequate management of, and accountability for, academics' commercial and scientific interests was the responsibility of academia and that it was not to role of journalists to judge whether this process was occurring satisfactorily.

However, given the extent of interactions between the health industries and academia, and the well recognised inadequacies of peer review, journalists' reliance upon academia to appropriately identify and manage their own conflicts of interest is both concerning and understandable. Concerning because it assumes that academia has been able to maintain its integrity and sufficiently separate its interests from those of industry (when available evidence suggests otherwise), and understandable because all professions engage in 'boundary work' to erect and maintain boundaries in order to constitute an independent and limited field of knowledge and practice (Fournier, 2000).

Indeed, the journalists in our study appeared to be limiting their roles and responsibilities—thereby repudiating any responsibility they had for harms resulting from their reporting. Jurisdictional boundaries were also used by journalists to limit their responsibility for the lay public's actions arising from reading or viewing their stories. The journalists in our study had a strong sense of the pervasiveness of their message and its potential to shape behaviour. But while they were clear that their primary aim was to raise awareness of novel health products, treatments and services through accurate and independent reporting journalists did not expect that they would be the only source of health-related information. They tended to believe that consumers should seek further information from the internet or from other experts such as medical professionals—who had a professional responsibility to inform, to act as gatekeepers to goods and services and to do what they could to ensure the health and wellbeing of their patients.

But while understandable, this perceived limit to journalists' "duty of care" is also not unproblematic, because it assumes that the lay public is aware of and accepts this reciprocal responsibility, and that the public has sufficient interest in, and skills at, accessing additional information and advice. Such expectations of the public are not unique to journalists, as they are a central tenet of postmodern public health discourses that promote the idea that the individual citizen is obliged to police their own health and engage in behaviours designed to minimise health risks (Burrows, Bunton, Muncer, & Gillen, 1995; Foucault, 1988; Petersen & Lupton, 1996).

Implications

The implications of these findings depend upon the extent to which we are willing to accept the adequacy of journalists' own views regarding the limits to their responsibilities. We would argue that, while all professions necessarily draw boundaries around their roles and responsibilities, journalists have a particular responsibility not to defer excessively to the epistemic or moral authority of the sources of their enquiry.

While it would not be fair to expect journalists to become scientific or biomedical experts, they need to be acutely aware of the extent and impact of industry funding of research and extremely cautious about unquestioningly accepting the views of academic "experts" who might themselves be unduly influenced by industry ties. Likewise, while the scientific method and peer review process provide at least some reassurance regarding the accuracy and validity of health-related information, the "peer review" process in which our participants placed so much faith is well known to be flawed (Hojat, Gonnella, & Caelleigh, 2003; Lipworth & Kerridge, 2011), and the fact that a piece of research has "passed peer review" does not guarantee its validity.

Given this, it is essential that journalists do not simply act as mouthpieces for an academic system that is itself subject to the relationships it has with industry and to the vagaries of its members. Indeed, it is arguable that as the distinctions between public and private science and between academia and commerce have broken down that journalists need to continue to critique academia as a whole. This will require not only that journalists carefully consider their sources, but that they continue to advocate for the establishment of systems that would facilitate the identification of

their sources' dualities or conflicts of interest. This could be achieved through such mechanisms as publicly accessible conflict-of-interest registers.

In addition, individual journalists and the profession as a whole could also demand that academic sources declare their conflicts of interests and subsequently make these explicit in their own reporting. We suggest this improved reporting can be achieved by health news journalists adopting a standard whereby academic-industry ties are universally reported. This will require journalists as a matter of course to investigate their sources' ties with industry and editors to devote word space and air time to the reporting of these relationships.

Whilst the issue of academic-industry relationships and influence has received attention academically, for example (Stossel, 2005), relatively minimal attention has been paid to this issue in the mainstream media leading to the public having little awareness of the role of industry in shaping research. In addition to ensuring transparency, news media reporting of academic-industry ties may facilitate informed public debate about the relationships between industry and academia, and ultimately create pressure for change. Adoption of a complimentary policy of mandatory declaration of funding and conflicts of interest in academic journal paper abstracts would go someway to addressing the limited access that journalists often have to the full text of academic research articles.

Such an activity would not only release health journalists from needing to apply professional judgments as to whether conflicts should be reported, but also leverage the characteristics of news media – interesting stories, wide ranging reach of articles,

critical stance in relation to industry, everyday language – to increase the public's knowledge of the process through which information about health products and services is produced and evaluated. In terms of the profession of journalism, in order to maintain commitments to accuracy, balance and independence and to uphold the aim of educating the public, health journalists can improve the integrity and quality of their reporting by recognising and adhering to a practice standard that benchmarks stringent, critical and transparent reporting of academic-industry ties. Whilst recognising how challenging this will be we suggest this is a crucial endeavour if journalists are indeed to have a significant impact on improving the lay public's knowledge of the processes that produce health information.

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